posed of. The world will always divide into two parties—those who recommend intensity of living at any price, and those who regard emotion as subsidiary to practical performance. Perhaps there can be no ultimate agreement between them. The fact remains, however, that with the exception of the few who covet Nirvana we all crave fulness of consciousness. Something of the difference between an attenuated consciousness and one of that complete resonance we crave may be imaged by means of a figure. Bits of brass, each keyed to a different pitch, and uncomplicated by the presence of overtones, will give a melody—cold, pure, complete in itself. Substitute a stringed instrument or a flute for the bits of metal, and the same melody will come, but richer in quality, each note containing within it faint hints of a wider range of harmoniousness. One by one add other instruments until we have a full orchestra: the melody will still emerge from the welter of sound, recognizable, but yet more miraculously enriched. For throughout its silences and woven into its very tissue come the deep reverberations of the accompaniment giving it increased substance and a new significance.

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RELATIVITY, NATURE AND MATTER

IT was inevitable that a theory of such outstanding importance as that of relativity should ultimately extend its influence to philosophy; and the following remarks, suggested by Professor Eddington's theory of matter,[1] are primarily from the purely philosophic standpoint, although from this the scientific aspect can not be dissociated.

1. From that standpoint, then, I think too much is read into the theory itself in regarding it as introducing "new conceptions of space and time" in any strict sense of the phrase "new conceptions." It would be truer to take it as achieving a more accurate *definition* of space and time intervals—as making their meaning more precise and definite, but without transforming them into anything "new." As Campbell has already pointed out long ago, the principle of relativity does "not render it necessary to abandon the hope of defining a time valid for all observers; (it is only) necessary to change somewhat the definition of that time. . . . We have (again) only to change our definition of length."[2] It is im-

[1] "The Meaning of Matter and the Laws of Nature according to the Theory of Relativity," *Mind*, April, 1920, p. 145.

[2] *Modern Electrical Theory*, pp. 371, 373. Philosophic readers may be interested in the very clear and concise account of the (old) theory given by Campbell here.

portant to bear this in mind, for otherwise the popular idea that the theory has "revolutionized" our ideas receives undeserved support.

But it is possible to take a deeper view, and trace in Professor Eddington's suggestion the fatal influence of subjective idealism, which philosophy itself is beginning to repudiate anew, but which still represents its last word to many scientists; so much so that Professor Eddington regards the principle that "the mind from the crude substratum constructs the picture of a substantial world" as being ontological, and calls this fundamental confusion "a commonplace" (p. 145). In other words, he mistakes the psychological "crude substratum" in which knowledge begins for the ontological basis on which the known world rests: "the World . . . is the universal substratum of things" (p. 148).[3] Such an error need not of course affect pure science itself, except perhaps psychology; unfortunately when science deals with its own ultimates it can not but become philosophic, and then the consequences of such an initial standpoint may become serious. Here, *e. g.,* the result is an immediate and incurable dualism between "external world" on one hand and "laws automatically imposed by mind" on the other;[4] between "properties" which can be described and a "nature" which can not—which is indeed noümenal and "outside the range of human understanding" (p. 147). Thus we obtain finally a noümenal World as the aggregate of all point-events, which has however a property ("is four-dimensional") which can be logically defined and which may therefore be called phenomenal. Further, between these noümenal point-events there is a relation, the "interval," also noümenal, since "its real nature is beyond our power to conceive" (p. 148). Evidently it is possible to know more about the new scientific noümenal world than about its philosophic predecessors; for an interval, in spite of being noümenal, can be measured practically; but perhaps this merely means that some of its (phenomenal) properties can be practically ascertained.

This World again appears to be spatial, for it has "adjacent portions—regions . . . philosophical space-time has been implicitly introduced in postulating the World to be four-dimensional" (pp. 148–150). But space and time are also (in some sense at least) objects of experience; in another aspect "derived concepts of con-

[3] Another striking recent instance is afforded by Mr. Elliot's *Modern Science and Materialism,* Introduction. I mention this as evidence of the philosophy mainly current in scientific circles.

[4] "Automatically" however conflicts with this dualism, for it implies that the (ontological) "crude substratum" is amenable to laws whose formation again is determined by the principle of the automatism. Thus the "crudeness" at once disappears, and we get a whole of complementary parts—world and mind—subject to a common principle. See below on "embryo mind."

siderable complexity";[5] but possibly what is meant is that the noümenal World has the phenomenal properties of time and space. It is extremely interesting to find that the theory involves certain absolute elements—"an absolute relation . . . a definite and absolute condition of the World . . . an intrinsic absolute difference";[6] so that apparently even pure relativity demands some kind of absolute.

2. This brings us to Professor Eddington's theory of matter and of natural laws. This "absolute condition of the World . . . is common to all parts of the world which are empty of matter . . . that condition . . . gives us the perception of emptiness." This raises a serious difficulty; for while our "perception of emptiness," as a *perception*,[7] is perfectly trustworthy and justified, it is plainly from any scientific standpoint (*i. e.*, the conceptual) wholly illusory; for (*a*) no one has ever perceived absolute scientific "emptiness"; but (*b*) even could this be produced and perceived, still no difference would be perceptible between it and space occupied by invisible gas, which *perception* most frequently interprets as empty. Thus the perception of emptiness, which Professor Eddington suggests is due to this "absolute condition of the World," is actually due to a radically different condition—to the World when matter is present in the form of invisible gas; and further, even if these two different conditions could be brought separately to affect the mind (in Professor Eddington's words, make an impression on the senses) still no difference whatever need necessarily be perceptible, and the theoretical suggestion he advances becomes quite untenable.[8]

In this connection again, what is meant by matter being an "object of experience"?—"the corresponding property of the world is perceived by us as a distribution of matter." For light is also "an object of experience";[9] but (quite clearly) never in the same sense as is matter; the levels of experience are quite different in the two cases, experience of light being mainly if not indeed wholly perceptual, while that of matter again is conceptual (though its properties or attributes are perceived). No theory whatever is

[5] P. 147. These aspects need not conflict, since the concepts must be derived from experience; but here no distinction whatever seems to be recognized between perceptual and conceptual experience; see also note 8 below.

[6] Pp. 150, note, 151, 148.

[7] P. 151. I mean in ordinary uncritical experience, for criticism, as I proceed to show, at once destroys Professor Eddington's contention.

[8] In view of the phrase "impression that condition would make on our senses" it would appear that Professor Eddington intends not to go beyond perception. Further on, however, we have "a quality which mind recognizes under the name of emptiness." Quite obviously this implies conception, and from the philosophic standpoint hopelessly confuses the issue; but again if taken conceptually equally serious difficulties arise. *Cf.* note 5 *ante*.

[9] Pp. 151, 146.

possible unless this distinction is recognized and strictly adhered to, which is certainly not done here.

3. It is difficult again to reconcile the following assertions:

(*a*) "Einstein's theory asserts as a law of nature . . . the new law of gravitation."

(*b*) "Einstein's law of gravitation is not a law of nature but the definition of a vacuum."[10]

Here there seem to be only two alternatives; either Professor Eddington contradicts himself, or he contradicts Einstein—*i. e.*, he denies that what Einstein regards as being "a law of nature" is really such; but only himself can decide which of these contradictions he intends to maintain.

In any case, the definition of a vacuum is a negative or privative definition; *i. e.*, it depends on the negation or thinking away of a prior entity (or concept), in this case matter; a vacuum is space containing no matter. This suggests that the whole treatment of this particular point rests on a confusion between two kinds of priority—the logical and the epistemological—a subject in itself much too extensive for treatment here except very briefly. *All* experience begins (omitting the "crude substratum") with "objects" and then proceeds to "matter" and "vacuum"; still further to "*G*" and "*g*" (regarded as types), which again is one definition of "vacuum." But when this stage has been attained, the steps leading to it are overlooked—the fact that "matter" "vacuum" and "*G*" all have a common origin is neglected; and the final definition is then regarded as being something fundamental, ultimate, original,[11] to which "matter" (even clocks and scales on p. 152) is a later addition or arbitrary restriction.

This wholly illogical procedure is widely prevalent though undetected; it corrupts, *e. g.*, our notions of life, force, cause, person, and is indeed perhaps the principal source of the reigning confusion between scientific and philosophic concepts, in the strict sense of these adjectives.

E. g., consider the equation (here condensed) $G = T$, on p. 150. Now (*a*) T is "compounded from the density etc. of the matter present." It is therefore a mere tautology to say (p. 151), (*b*) this "equation teaches us what density, etc., is the perceptual equivalent of any particular value of this world-property." We are merely deriving from our equation what was previously inserted in it; and thus a simple reversal of the course of thought is misinterpreted and elevated into a fresh addition to our knowledge, while in truth it is at its best no more than a better defining of one and the same concept.

[10] Pp. 150, 151.

[11] I am not of course questioning its scientific value, only the further conclusions which it is sought to derive from it.

Much the same is true of the assertion (p. 151)—it "describes how (an) undefinable quality . . . is appreciated by the human mind." This appears at first sight to be a solution of that old problem, the relation between mind and noümenon; but its value completely vanishes[12] when we recall that the "undefinable quality" (or its basis or content—the terminology is rather obscure) has been obtained in the first instance by abstracting from "intuitive notions of space and time."[13] Indeed, this initial abstraction is so far lost sight of that "we may attribute to undefinables *whatever nature we may conceive* as best fitted to affect the mind" (p. 152, my italics). Would that philosophy could adopt this short and simple method of dealing with its noümena![14]

Such abstraction, again, plainly removes the limits or conditions which regulate mathematical procedure. This in itself is nothing new; imaginary quantities are familiar enough. It is therefore almost another tautology to observe that the "results must hold in any imaginary world just as in the actual" (p. 153); in other words, continue to hold when the originally limiting conditions have been deliberately and of set purpose removed. But it is not legitimate to elevate, without further argument, such a set of unlimited conditions into an "external World" and to create a dualism between this and the actual or real world as Professor Eddington does.[15] This again is sheer confusion, only rescued from absurdity by its naïve picturesqueness, between the logical and the ontological status of a concept. "Imagine an embryo mind surveying the external World" (p. 154); an "embryo mind," however, which "feels inborn necessity," which "seeks further" than point-events, intervals, and "*g*," and chooses matter as "suitable material"; which thus possesses to begin with a high capacity for comparison, judgment, selection, and *afterwards* develops "senses and imagination," thus violating all the canons of mental and every other type of evolution!

Philosophy, of course, can raise no objection to the concept of World or Nature as an unconditioned aggregate of entities of any kind, point-events or other. But it is, I submit, entitled to question

[12] Again, not its scientific value, but its logical or epistemological.

[13] P. 147. *Cf.* also (p. 153) "identity due to the way in which the expression has been built up from the simpler elements *g*." Again "built up" is forgotten and then the resultant "permanence" and "conservation" are regarded as entirely new concepts instead of more exact definitions of old ones; see also next note.

[14] Curiously enough we find on p. 153: "We have thus arrived at a definition of matter in terms of analytical concepts." But Professor Eddington does not seem to realize the real significance of "arrived at."

[15] Pp. 153, 154. *Cf.* p. 155; "all that Nature was required to furnish is a four-dimensional aggregate of point-events."

ab initio the ascription to this concept of an ultimate ontological status, so that it becomes the criterion, at once external and absolute, of reality, with which the actual or real world is then to be compared and valued, and from which it is regarded as produced by some mysterious operation of the mind. It would be as reasonable to multiply the figure representing the national debt by $\sqrt{-1}$ and then regard the imaginary result as the true basis of the country's financial stability.

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REVIEWS AND ABSTRACTS OF LITERATURE

Spiritual Pluralism and Recent Philosophy. C. A. RICHARDSON. Cambridge: University Press. 1919. Pp. xxi + 335.

In this volume we find anew, in the setting of recent philosophy, the central theses of Leibnitz's monadology: the unity, substantiality and eternity of the subject (monad); the identity of causality and activity; the interpretation of matter as the "appearance" of monads; the theory of the relation of the mind to the body as the dominance of one monad in a society of other cooperating monads. Spiritual pluralism is, however, not regarded by Mr. Richardson as a demonstrable, but as a most highly probable, doctrine. In his opinion, its probability has been increased, not diminished, by the contributions of such recent philosophers as Bertrand Russell and the new-realists in America; and to prove this is, I take it, the chief aim of his book. Unlike James Ward in *The Realm of Ends,* the author does not seek to present a developed picture of a pluralistic universe, but to solve certain special problems and to remove prominent misunderstandings.

In the first chapter, entitled "Scientific Method in Philosophy and the Foundations of Pluralism," it is argued that Russell's so-called "scientific method" has strengthened spiritualism by showing that matter can be reduced without remainder to constructions of sense data. It might have been added that pragmatism has shown the motive to these constructions. And against all forms of materialism and realism, spiritualism maintains its advantages: (1) of recognizing the subject of experience; (2) of explaining the world, that is, of interpreting it in terms of experience itself, instead of merely describing it in terms of abstract concepts; (3) of working with a single principle. The failure to recognize the subject of experience remains, according to the author, the great vice of the new-realism. For the existence of the self is indubitable: we can not know it "by acquaintance," but from such facts as knowing and